

REMARKS

Claims 1, 2 and 4-10 are now pending in the application. Claim 6 has been canceled. The amendments to the claims contained herein are of equivalent scope as originally filed and, thus, are not a narrowing amendment. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claim 6 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. Claim 6 has been canceled.

REJECTION UNDER 35 U.S.C. § 103 AND §102

Claims 1-2 and 4-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ng et al. (US 2003/0011474). Claims 7 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Shanks et al. (US2002/0152044). These rejections are respectfully traversed.

In applicants' invention, a first waveform represents a first logic state (e.g., Logic "1") and a second waveform represents a second logic state (e.g., Logic "0"). Each of these waveforms are different from each other in terms of how long each waveform exists at a high level after rising from a low level at time T/2. See applicants' Fig 2A for an illustration. Note that Waveform A in Fig. 2A exists in the high level for the entire second half of the waveform (after rising at time T/2). Waveform B exists in the high level for a shorter time after rising at time T/2, because it falls back to the low level after time t1.

In applicants' invention there is a third waveform (Waveform C(2) in Fig 2A) that is used, in effect as a replacement for a string of Waveform B's. In Figure 2A, the Waveform C replaces two Waveforms B; in Fig 3 Waveform C(3) replaces three Waveforms B, and so forth. Thus Waveform C is a "stand in" for a series of 2 or more Waveforms B.

This third waveform is different from the other two waveforms in that it has a unique configuration: its rising transition does not occur at the junction. That is, the rising transition does not occur at the junction between the waveforms, and thus it is possible to make an association between the rising timing and a unit of data. This makes it easy to generate a clock signal in synchronism with the data by detecting the rising transition.

The Ng reference cited by the Examiner does not employ applicants' unique third waveform. Rather, Ng is simply sending a "SYN" block—which serves an entirely different purpose and does not represent or "stand in" for a sequence of other waveforms.

Accordingly, in order to more fully distinguish applicants' third waveform from Ng's SYN block, claim 1 has been amended. To simplify the claim, the first and second waveforms are defined by their respective logical values:

- first waveform: one of codes "0" or "1"
- second waveform: the other of codes "0" or "1"

Then the third waveform has been defined as corresponding to m codes (m is a natural number equal to or greater than 2)—in Fig 2A, m was 2; in Fig 3 m was 3. The third waveform has been further defined such that each of said m codes is the other of said codes "0" or "1" expressed by the second waveform.

It is respectfully submitted that this language fully distinguishes over Ng's SYN block, which clearly cannot function to correspond to m instances of the logical value represented by the second waveform. Reconsideration is therefore respectfully requested.

The Examiner's attention is also drawn to the correction made in the recitation of the second waveform. Like the first waveform, the second waveform rises only at position T/2. See Fig 2A for verification of this. The claim as originally presented had an error, which has now been corrected so as to conform to the specification.

The significance of applicants' unique third waveform is explained in the specification and will be briefly summarized below.

First, as described in the specification, it is generally known that it is preferable to obtain 50% duty ratio of data symbols. But this may not always occur in practice. If the duty ratio of one of the data symbols is not 50%, it is possible for the average value (reference value) of DC components of received data to drift away from a certain fixed value (generation of DC offset) as the data sequence is received. Signal detection is based on detecting of respective high and low levels relative to the reference value. Thus, if the reference value should drift, proper detection may fail. Unfortunately, with conventional technology, this undesirable condition will naturally occur if the same signal is continuously received for a long time such that a large DC offset is generated. Such a large DC offset results in detection error, particularly if the level of the received signal suddenly changes.

Applicants' invention solves this problem by maintaining a 50% duty cycle ratio in all three waveforms, and by employing the third waveform, which greatly simplifies the generation of a clock signal from the received waveforms.

Regarding clock generation in applicants' system: by detecting rises of the waveforms, it is possible to generate a clock signal, which synchronizes with the data without providing a complex mechanism. To illustrate by way of example, assume the first waveform corresponds to Logical "0", and the second waveform corresponds to Logical "1". In such a case, the third waveform corresponds to successive m codes of Logical "1".

With regard to the first and second waveforms, the first waveform corresponds to a single Logical "0", the second waveform corresponds to a single Logical "1", and each of the first and second waveforms has only one rise. Therefore, it is clear that a rise of the first or second waveform should synchronize with Logical "0" or Logical "1".

On the other hand, the third waveform which corresponds to successive m codes of Logical "1" includes m rises. Therefore, it is possible to recognize that each of m rises of the third waveform should correspond to Logical "1". As a result, it is possible to recognize that all of the rises of the waveforms correspond to Logical "0"/"1".

Therefore, in such a case, each of the rises corresponds to Logical "0" or Logic "1", and, by simply detecting rises, it is possible to generate the clock signal which synchronizes with the data.

Compared to the present application, Ng may have a superficial similarity to the present application because all of three waveforms of Ng have 50% duty ratio. (As explained, the SYN waveform is for a completely different purpose.) However, Ng is radically different from the present application because rises of the waveforms of Ng do not correspond to Logical "0" or "1". That is, in Ng, even if rises of the waveforms are detected, it is not possible to generate the clock signal which synchronizes with the data (see FIG. 3 of Ng). Lacking applicants' simple clock generation capability, Ng needs a phase-locked loop and an oscillator to generate a clock signal that synchronizes with the data. Therefore, by applying waveforms of Ng, a more complex and larger apparatus is necessary for communication compared to the present application.

In Claim 2, waveforms have opposite high/low level to Claim 1. Therefore, as described above, Claim 2 has the same constitution and advantage as Claim 1.

Regarding Claim 6, the Applicant canceled this claim.

Regarding Claims 4 and 5, Claim 4 shows a concrete example of the third waveform of Claim 1, and Claim 5 shows a concrete example of the third waveform of Claim 2. Therefore, Claims 4 and 5 include the same constitution and advantage as Claims 1 and 2.

Claims 7-9 stand rejected under 35 U.S.C. § 103(a) as being anticipated by Shanks. This rejection is respectfully traversed.

As described above, Claim 1 and 2 should be allowed, and Claims 7-9 depend on Claims 1 and 2. Therefore, Applicant believes that Claim 7-9 should be allowed.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a

full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

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Respectfully submitted,

By Gregory A. Stobbs

Gregory A. Stobbs

Registration No.: 28,764

HARNESS, DICKEY & PIERCE, P.L.C.

P.O. Box 828

Bloomfield Hills, Michigan 48303

(248) 641-1214

Attorney for Applicant